

ARTHROPOD BIODIVERSITY IN 3 STEPPE REGIONS OF DJELFA AREA (ALGERIA)

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ABSTRACT

Present study is performed in 3 stations of steppe areal of Djelfa. The aim of this work is to study the richness arthropods of those three stations using Barber pots' methods. According to this study, we point out 39 species in station of Taïcha, 41 species in station of Guayaza and 46 species in station of El Khayzar. In terms of species, *Cataglyphis bicolor* is the most dominant in the station of Taïcha (RA% = 42.6%), *Messor capitatus* is dominating in El Khayzar (RA% = 81.4%) and *Cataglyphis* sp. 2 (RA% = 23.21%) is most dominant in Guayaza .

KEYWORDS: Arthropods, Biodiversity, Barber Pots, Steppes, Djelfa, Algeria

INTRODUCTION

Through their high extension, Algerian covered steppe distance offer very large richness of arthropods in other light on species and individuals number. This richness has caught eye of several authors in Algeria, as Athias Henriot (1946) on ecology of *Cataglyphis bicolor* in region of Beni Ounif South or Oran. Bernard (1951) on ants in High Plateaux, Doumandji and al (1993) on Orthopteras in natural reserve of Mergueb (35°36' N. 3°57' E). Fellaouine and Louveaux (1994) on *Praephippigera pachygaster* Lucas (Tettigoniidae) round of Sétif (36° 11' N.; 5° 25' E.), of Bounechada and al (2006) in steppe region of Setif. In region of Djelfa only two works have been performed which are those of Brague-Bouragba and al. (2006.2007). But those works have been interested only by a part of entomofauna which is the one of Coleopteran. Present study is making up works already performed by drawing up new list of arthropods species of this region.

Presentation of Djelfa Region

Region of Djelfa is in the central part of High Plateaux, at level Algerian steppe (34°11' to 34°54' N ; 3°15' to 3°46'E). In North, region,study is limited by relieves of Djebel Sehari and by Salt Big Rock. In its southern part stand foothills of Ouled Nail Mountains, of Djebel Djellal Chergui et of Djellal Gharbi. In East, Chott Zahrez Chergui spreads (34°57' N. 03°20' E), and at West of Chott Zahrez Gherbi appears (34°56'N; 0.3°00' E) (Figure 1). The Region is characterized on the one hand by a weak rain-gauge which is yearly between 100 to 400 mm, irregular precipitations and on the other hand by high temperature. In July with average up to 30°C. Steppe vegetation is dominant by Alfa (-grass) (*Stipa tenacissima* Linné) and by white Artemisia (*Artemista herba-alba*)Asso.

Material and Methods

Goal of Barber pots use is to capture species which are actively moving at ground surface. For that reason, work performed on the ground is to led 10 cylindrical boxes of 1.dm 3 volume each one at ground level. Efficiency of this

technique may be improved in putting bait into trap in order to attract animal. (Lamotte and Bourliere, 1969). This one becomes an attraction trap. Barber pots led in line or on the same level curve at regular interval of 5 m and must be let in place only during 24 hours. Captured species identification is performed at level of Agricultural and Forestry Zoology Laboratory using determination keys as the one of Perrier (1927) as for Coleoptera, Chopard (1943), as for Orthoptera and Vachon (1952) as for Arachnida. This identification is performed by professor Doumandji Salaheddine. Results exploitation is made on the one hand by composition ecological indexes which are total richness and relative abundance RA% and ecological indexes of structure which are diversity index of Shannon Weaver and of Equitability and other part by statistical method which is Factorial Analysis of Correspondences.FAC.

RESULTS AND DISCUSSIONS

Results of Ecological Index of Composition

Number of trapped individuals into Barber pots varies according to stations and to months. Effectively, at Taïcha, obtained results show that species of ants are dominating. That is noted nearly during all months. In July, *Messor capitatus* dominates (41.7%). On august and September is characterized by dominance of *Cataglyphis bicolor* with equal frequencies respectively of 44.8% and to 66.1% (Table 1). Boukeroui (2006) in studying entomo-fauna of *Pistacia vera* at Blida, points out that specie is represented by 6.1%. In April 2008, it is also *Cataglyphis* sp 2 which dominates with 24.2%. Ants' dominance is confirmed by Boussad and Doumandji (2004) who show that ants *Aphaenogaster testaceo – pilosa* (26,8 %) and *Messor Barabra* (12.6%) are two species highly represented in plot of *Vicia faba* at Technical Institute of High Cultivation of Oued Smar. Within the framework of the present study, at El Khayzar during year 2007, they are other species of ants which dominate during sampling months (Table 2). Effectively, in May it is *Cataglyphis* sp. 2 which seems to be the most frequent (44.7%) and in July, *Messor arenarius* with 25%. In the same station, in August and in September *Mestor capitatus* is dominating with respectively 81.1% and 96.1%. By using the same trapping technique Fekkoun (2009) in region of Baba Ali in Mitidja reports *Mestor Barbara* as dominating specie (39.5%). Likewise, as for Boukeroui (2006) near Blida who writes that *Pheidole pallidula* is better represented (73.5%) followed by *Aphaenogaster – testaceo – pilosa* (8.2%).On the other hand, in station of Taïcha in April, dominance comes back to *Erodius* sp (RA% = 36.8%). Brague-Bouragba and al (2007). In region of Djelfa thanks of the same trapping method mentioning a rate of *Erodius* sp, too much weak than the one reported in the present study so much in 2006 (1.1%) than in 2007 (1.2%).Within of this study at Guayaza in April, 2008, *Erodius* sp is represented by rate of 8.4% (Table 3) higher value than those noted by previous authors.Weaker value concerns station of Taïcha in May (2007) and in July (2007) where 6 species were found. Maximum trapped species is recorded in April 2008 for three stations with 17 species at Taïcha 14 species at El Khayzar and 31 species at Guayaza. Brague- Gouragba and al (2006) when studying arthropods in Djelfa's region have point out higher numbers than those of the present study which are 71 species at Zaafrane.I.,61 species at Zaafrane II and 62 species at El Mesrane. Here, il is reported that methodology opted by those authors is different to the one of this study because harvest of traps contents is done every 15 days beginning of January until July of 2001, which explains high value of richness found by those authors. Likewise, Yasri and al (2006) working at Senalba Cherghui at Djelfa have noted presence of 51 species. Weaker values are noted by Soutou and al (2007) in region of El-Mesrane who mention richness state varying between 17 species in March and 42 species in May.

Results or Ecological Indexes of Structure

In the whole, diversity values are high varying between 1.9 and 3.7 bits at Taïcha, between 3.02 and 3.5 bits at El

Khayzar and between, 3.6 and 4.0 bits at Guayaza. Those values translate large diversity in species in the three stations studied. Present results confirm those of Setbel (2008) mentioning values being between 5.72 bits in occupied plot by durum wheat and 4.3 bits unploughed land. Likewise, Yasri and al (2006) found higher values of diversity, which are of 4.6 bits at mountains level of Senalba in Djelfa and 5.3 bits in mountains of Ghoufi in Aures. On the other hand, in two cases, fauna diversity in species is low, particularly in November (0.3 bits) and in August (0.7 bits) within station of El Khayaza. Elsewhere, in South of Deux Sevres, Clère and Bretagnolle (2001) reported weak diversity of 1.1 bits. Concerning populating equitability at Taïcha and at Guayaza, values of this index are high and tender towards 1. This tendency to 1 is also noted in the same region near El Mesrane by Brague – Bouragba and al (2006). Those authors point out 0.8 at El Mesrane I and at El Mesrane III and 0.9 at El Mesrane II. They point out at Zaafrane, two other strong values of equitability index of 0.7 at Zaafrane I and 0.8 at Zaafrane II. On the other hand at El Khayzar during two sampling months, weak equitabilities have been obtained with 0.2 in August and 0.1 in November. In Ile-de-France, Vieux and Rameil (2004) have mentioned 0.4 in 2000, 2001 and 2003, which shows populating dominance studied by only one specie..Concerning size of those species, the ones which have size of 9 mm are better represented within stations of Taïcha (30%) and of Guayaza (43.8%). In station of Boualem-Quiquave Derdoukh (2008) reports sizes class the most represented is the one of 3 mm in July (31.6%) and in August (22.6%).On the other hand, in the present study, this class is weakly represented in the three stations; 2.1% at Guayaza, 5.2% at El Khayzar and 9.1% at Taïcha. Within station of El Khayzar, Size class most frequent is of 6 mm (22.4%), higher value to those reported by Ziada (2006) in region of Guelma (4.7%).

Results Exploitation by Factorial Analysis of Correspondences

Factorial analysis of correspondences performed, has as goal to highlight common species between three study stations, those of Taïcha, of El Khayzar and of Guayaza, and so those which are proper to each of the three stations (Figure 2).

Stations of Taïcha (TAI), of El Khayzar (ELK) and of Guayza (GUA) are situated in 3 different quadrants. Guayaza (GUA) in found in the 1st quadrant, Taïcha (TAI) in quadrant 2 and E l Khayzar (ELK) in the 3rd quadrant which it show that the three stations are different between them by species which they contain. Derdoukh (2008), has performed a F.A.C to highlight fauna differences which exist between the 3 stations, which are Baraki 2007 (B 07), Baraki (2008) (B 08), and Soumaa (SOU).This author found that those three stations are scattered in 3 different quadrants

Concerning species distribution in function of our three stations 4 different groups are obviously in the first appointed by A, includes omnipresent species as *Oxytelus sp* (028) and *Tapinoma nigerrmul* (071) B group gathers species only the ones founds in the station of Taïcha (TAI) as *Sphincterochila candidissima* (001) and *Pyrrhocoris sp* (010). As to C group, it concerns species which are trapped only at level of El Khayzarstation (ELK) notably *Hodotermes sp* (006), *Zabrus sp* (016) and *Bufo mauritanicus* (080) Finaly group D composed of species which are seen only at level of Guayaza station as *Pheidole pallidula* (075), *Synthomus exclamationis* (015 and Asida sp.2 (027). Setbel (2008) using same statistic method to exploit trapped species in Barber pots, led in 7 agricultural plots in Mitidja has obtained 8 groups with the one showed par A contains two common species to all soles.

On his side, Boussad (2003) thanks to another trapping technique, the ones of yellow plates, compares captures species in three stations, the one of Oued Smar (OUE) in Mitidja, of Tarihant (TAR) and of Timizart – Loghabar (T) in Grande Kabylie and obtains 7 clouds of points which one among them gathers omnipresent species.

CONCLUSIONS

Important number of captured species shows the large richness of arthropods specially that of entomofauna of Djelfa. Several Tenebrionidae seem very frequent captured in Barber pots as *Zophosis punctata*, *Erodius* sp., *Pimelia* sp., *P. interstitialis* et *P. angulata* and so of Caraboidea with *Synthonus exclamationis* and *Cymindis leucophthalmus*. A particular attention must be taken to Hymenoptera in region, notably Formicidae as *Messor Capitatus* *Messor arenarius* and *Cataglyphis bicolour*

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APPENDICES

Table 1: Relatives Abundances of Species Captured in the Pots Barber at Taïcha Station

	2007								2008	
	V		VII		VIII		IX		IV	
	ni.	AR %	ni.	AR %	ni.	AR %	ni.	AR %	ni.	AR %
<i>Sphincterochila candidissima</i>	-	-	-	-	1	0,5	-	-	-	-
<i>Aranea</i> sp.	-	-	-	-	1	0,5	-	-	-	-
<i>Dysderidae</i> sp. ind.	-	-	-	-	2	0,9	-	-	-	-
<i>Dysdera</i> sp.	-	-	1	8,3	-	-	-	-	-	-
<i>Gryllulus</i> sp.	-	-	-	-	1	0,5	-	-	-	-
<i>Pyrrhocoris</i> sp.	-	-	-	-	1	0,5	-	-	-	-
<i>Pyrrhocoris aegyptium</i>	1	7,1	-	-	-	-	-	-	-	-
<i>Jassidae</i> sp. ind.	-	-	2	17	-	-	-	-	-	-
<i>Amara</i> sp.	-	-	1	8,3	-	-	-	-	-	-
<i>Cymindis leucophthalmus</i>	-	-	-	-	-	-	-	-	1	3,03
<i>Oxytelus</i> sp.	-	-	2	17	1	0,5	1	1,8	-	-
<i>Omophlus</i> sp.	-	-	-	-	-	-	-	-	1	3,03
<i>Anobiidae</i> sp.ind.	-	-	-	-	-	-	1	1,8	-	-

Table 1 : Contd.,

<i>Zophosis punctata</i>	4	29	-	-	-	-	-	-	-	-	-
<i>Pimelia</i> sp.	3	21	-	-	4	1,9	-	-	3	9,09	
<i>Pimelia interstitialis</i>	-	-	-	-	-	-	-	-	2	6,06	
<i>Prionotheca</i> sp.	-	-	-	-	-	-	-	-	1	3,03	
<i>Blaps</i> sp.	-	-	-	-	-	-	5	8,9	-	-	
<i>Erodius</i> sp.	4	29	-	-	-	-	-	-	1	3,03	
<i>Scaurus</i> sp.	1	7,1	-	-	1	0,5	-	-	-	-	
<i>Sepidium</i> sp.	-	-	-	-	-	-	-	-	1	3,03	
<i>Adelostoma</i> sp.	-	-	-	-	1	0,5	-	-	-	-	
<i>Adimonia circumdata</i>	-	-	-	-	-	-	-	-	1	3,03	
<i>Timarcha</i> sp.	-	-	-	-	-	-	-	-	2	6,06	
<i>Plagiographus</i> sp.	-	-	-	-	-	-	1	1,8	-	-	
<i>Scoliidae</i> sp. ind.	-	-	-	-	-	-	-	-	1	3,03	
<i>Formicidae</i> sp. ind.	-	-	-	-	-	-	-	-	1	3,03	
<i>Messor</i> sp.	-	-	-	-	20	9,3	1	1,8	1	3,03	
<i>Messor capitatus</i>	-	-	5	41,7	-	-	1	1,8	-	-	
<i>Messor arenarius</i>	-	-	-	-	-	-	-	-	2	6,06	
<i>Camponotus</i> sp.	-	-	-	-	70	32,6	-	-	-	-	
<i>Cataglyphis</i> sp. 1	-	-	-	-	3	1,4	4	7,1	-	-	
<i>Cataglyphis</i> sp. 2	-	-	-	-	-	-	-	-	8	24,2	
<i>Cataglyphis bicolor</i>	1	7,1	-	-	96	44,7	37	66,1	-	-	
<i>Crematogaster</i> sp.	-	-	-	-	1	0,5	3	5,4	-	-	
<i>Tapinoma nigerrimum</i>	-	-	-	-	-	-	-	-	2	6,06	
<i>Monomorium</i> sp.	-	-	-	-	11	5,1	1	1,8	2	6,06	
<i>Tetramorium</i> sp.	-	-	-	-	-	-	-	-	3	9,09	
Diptera sp.	-	-	1	8,3	1	0,5	-	-	-	-	
Nematocera sp. ind.	-	-	-	-	-	-	1	1,8	-	-	
Total	14	100	12	100	215	100	56	100	33	100	

ni. the number of individuals; AR% Relativess Abundances of

Table 2: Relativess Abundances of Species Captured in the Pots Barber at El Khayzar Station

	2007						2008			
	V		VII		VIII		IX		IV	
	ni.	AR%	ni.	AR%	ni.	AR%	ni.	AR%	ni.	AR%
<i>Aranea</i> sp.	1	2,13	-	-	-	-	-	-	-	-
<i>Dysdera</i> sp.	1	2,13	-	-	-	-	-	-	-	-
<i>Phalangida</i> sp. ind.	5	10,64	-	-	-	-	-	-	-	-
<i>Entomobriidae</i> sp. ind.	-	-	2	5,56	-	-	-	-	1	2,63
<i>Hodotermes</i> sp.	1	2,13	-	-	-	-	-	-	-	-
<i>Lygaeidae</i> sp. ind.	-	-	-	-	-	-	-	-	-	-
<i>Pyrrhocoris aegyptium</i>	-	-	-	-	2	0,82	-	-	-	-
<i>Jassidae</i> sp. ind.	1	2,13	-	-	-	-	-	-	-	-
<i>Jassidae</i> sp. 2	-	-	3	8,33	-	-	-	-	-	-
<i>Coleoptera</i> sp. ind.	-	-	2	5,56	-	-	-	-	-	-
<i>Zabrus</i> sp.	-	-	-	-	-	-	-	-	1	2,63
<i>Scarabeidae</i> sp. ind.	-	-	1	2,78	-	-	-	-	-	-
<i>Aphodius</i> sp.	-	-	1	2,78	-	-	-	-	-	-
<i>Anisoplia</i> sp.	-	-	-	-	-	-	-	-	1	2,63
<i>Staphylinidae</i> sp. ind.	-	-	1	2,78	-	-	-	-	-	-
<i>Oxytelus</i> sp.	-	-	6	16,67	-	-	-	-	-	-
<i>Conosoma</i> sp.	-	-	2	5,56	-	-	-	-	-	-
<i>Pimelia</i> sp.	1	2,13	-	-	-	-	-	-	-	-
<i>Pimelia interstitialis</i>	3	6,38	-	-	1	0,41	1	0,15	-	-
<i>Pimelia angulata</i>	1	2,13	-	-	-	-	-	-	-	-
<i>Prionotheca</i> sp.	2	4,26	-	-	-	-	-	-	-	-

Table 2: Contd.,

<i>Blaps</i> sp.	1	2,13	-	-	-	-	4	0,60	-	-
<i>Erodius</i> sp.	2	4,26	-	-	-	-	-	-	14	36,84
<i>Scaurus</i> sp.	1	2,13	-	-	2	0,82	-	-	-	-
<i>Coccinella algerica</i>	-	-	1	2,78	-	-	-	-	-	-
<i>Timarcha</i> sp.	1	2,13	-	-	-	-	-	-	-	-
<i>Chrysomela bicolour</i>	-	-	-	-	-	-	-	-	1	2,63
Curculionidae sp. ind.	-	-	1	2,78	-	-	-	-	-	-
<i>Baridius</i> sp.	-	-	-	-	-	-	-	-	1	2,63
<i>Larinus</i> sp.	-	-	-	-	1	0,41	-	-	-	-
Chalcidae sp.	-	-	-	-	-	-	-	-	1	2,63
Braconidae sp. ind.	-	-	1	2,78	-	-	-	-	-	-
Formicidae sp ind	-	-	-	-	-	-	-	-	1	2,63
<i>Messor</i> sp.	-	-	-	-	5	2,06	-	-	-	-
<i>Messor capitatus</i>	-	-	1	2,78	197	81,07	639	96,1	-	-
<i>Messor arenarius</i>	-	-	9	25,71	-	-	1	0,15	3	7,89
<i>Cataglyphis</i> sp.1	2	4,26	-	-	7	2,88	8	1,2	1	2,63
<i>Cataglyphis</i> sp.2	21	44,68	-	-	-	-	-	-	-	-
<i>Cataglyphis bicolor</i>	-	-	-	-	27	11,11	8	1,20	4	10,53
<i>Tapinoma nigerrimum</i>	-	-	1	2,78	-	-	-	-	-	-
<i>Monomorium</i> sp.	-	-	-	-	-	-	2	0,30	4	10,53
<i>Tetramorium</i> sp.	-	-	-	-	-	-	1	0,15	-	-
<i>Tetramorium biskrensis</i>	-	-	-	-	-	-	-	-	1	2,63
Lepidoptera sp. ind.	3	6,38	-	-	-	-	-	-	-	-
Diptera sp.	-	-	1	2,78	-	-	1	0,15	-	-
<i>Cyclorrhapha</i> sp.	-	-	3	8,33	-	-	-	-	4	10,53
Other	-	-	-	-	1	0,41	-	-	-	-
Total	47	100	36	100	243	100	665	100	38	100

ni. the number of individuals; AR% Relativess Abundances of

Table 3: Relatives Abundances of Species Captured in the Pots Barber at Guayaza Station

	XI		IV	
	ni.	AR %	ni.	AR %
<i>Dysderidae</i> sp. ind.	-	-	2	2,11
<i>Jassidae</i> sp. ind.	2	7,69	1	1,05
<i>Synthomus exclamatorius</i>	1	3,85	1	1,05
<i>Cymindis leucophthalmus</i>	-	-	3	3,16
<i>Onthophagus</i> sp.	1	3,85	-	-
<i>Aphodius</i> sp.	-	-	1	1,05
<i>Anisoplia</i> sp.	-	-	1	1,05
Anthicidae sp. ind.	-	-	1	1,05
<i>Micrositus</i> sp.	-	-	1	1,05
Tenebrionidae sp. ind.	-	-	1	1,05
<i>Asida</i> sp. 2	-	-	1	1,05
<i>Erodius</i> sp.	-	-	8	8,42
<i>Pimelia angulata</i>	-	-	2	2,11
<i>Pimelia grandis</i>	-	-	1	1,05
Anobiidae sp. ind.	1	3,85	-	-
<i>Omophlus</i> sp.	-	-	-	-
<i>Oxytelus</i> sp.	4	15,38	-	-
<i>Conosoma</i> sp.	2	7,69	-	-
<i>Coccinella algerica</i>	1	3,85	-	-
<i>Timarcha</i> sp.	-	-	4	4,21
<i>Chrysomela bicolour</i>	1	3,85	1	1,05
<i>Adimonia circumdata</i>	-	-	1	1,05

Table 3: Contd.,

<i>Adimonia farimenti</i>	-	-	2	2,11
<i>Curculionidae</i> sp. ind.	2	7,69	-	-
<i>Strophomus</i> sp	1	3,85	-	-
<i>Brachycerus</i> sp.	-	-	1	1,05
<i>Anthophoridae</i> sp. ind.	-	-	1	1,05
<i>Nomada</i> sp.	-	-	2	2,11
<i>Chalcidae</i> sp. ind.	1	3,85	-	-
<i>Apoidea</i> sp. ind.	-	-	1	1,05
<i>Scoliidae</i> sp. ind.	-	-	1	1,05
<i>Pompilidae</i> sp. ind.	-	-	3	3,16
<i>Messor</i> sp.	4	15,38	-	-
<i>Messor capitatus</i>	2	7,69	1	1,05
<i>Messor arenarius</i>	-	-	5	5,26
<i>Camponotus</i> sp.	-	-	16	16,84
<i>Cataglyphis</i> sp. 2	-	-	26	27,37
<i>Cataglyphis bicolor</i>	3	11,54	2	2,11
<i>Tapinoma nigerrimum</i>	-	-	1	1,05
<i>Pheidole pallidula</i>	-	-	1	1,05
<i>Lepidoptera</i> sp. ind.	-	-	1	1,05
<i>Cyclorrhapha</i> sp.	-	-	1	1,05
Total	26	100	95	100

ni. the number of individuals; AR% Relatives Abundances of

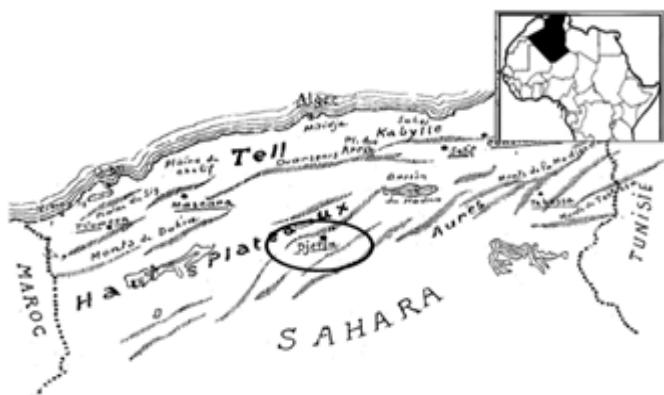


Figure 1: Location of the Study Area (Source: National Institute of Cartography (Algiers)

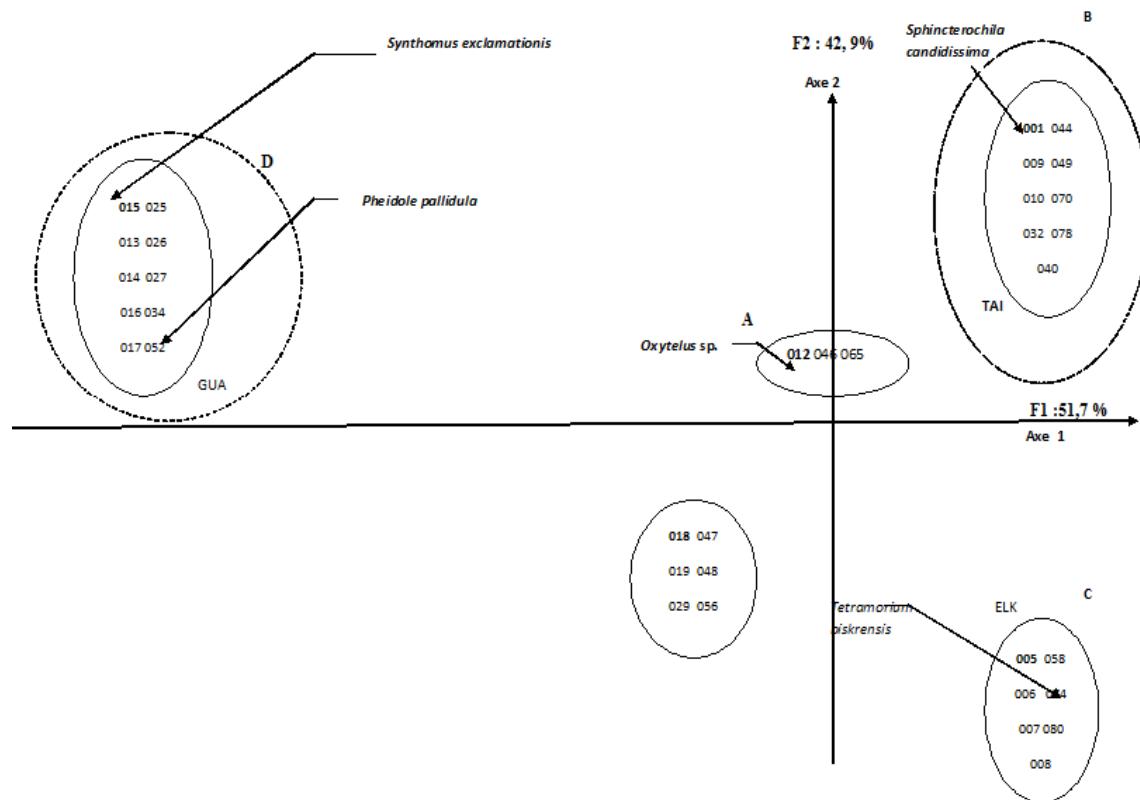


Figure 2: Factorial Map of Trapped Species by Traps Pots in the Three Studies Stations

